

Educational Technology Use - Ukraine

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Introduction

This chapter is devoted to a better understanding of Ukraine (Europe) and its educational technology issues. This country is underresearched for international education scope. However, it has unique, not belonging to any other Post-Soviet countries, features that will be described and explained further. When the Russian invasion of Ukraine started, the need for developing and adapting educational technology for Ukrainian schools and universities increased dramatically due to the demand for students to continue education at home, in shelters or in temporary accommodations in Ukraine or abroad. With the analysis of the most current resources regarding educational technology, this chapter can open Ukraine to a new perspective for educators and researchers.

Context

Ukraine is a European country located in the central part of Eastern Europe at the intersection of the transport routes between Europe and Asia and between the Scandinavian countries to the Mediterranean region on the Black and the Azov seas (Ministry of Economic Development and Trade of Ukraine, n.d.). Sharing a lot of cultural history with the Russian Empire and the USSR, Ukraine has always been oppressed by those (Mezentsev et al., 2015). However, not all of its cultural heritage is undamaged. Therefore, Ukraine remains a unique European country, combining its closeness to Europe and shared Orthodox values (Reeskens, 2022).

Ukraine, the largest of the countries that exist entirely within Europe (Mappr, n.d.), is populated by 43,2 million citizens, with 69,4% living in urban areas (Worldometer, 2022). Network Readiness Index (2020) states Ukraine as the second lower-middle-income country

from the top (Danyliuk et al., 2021). Lower-middle-income economies are those with a GNI per capita, calculated using the World Bank Atlas method, of more than \$1045 but less than \$4,125 (The World Bank, n.d.). It can be expressed through differences in the standards of living of the population, e.g., income inequality reported in the Mishchuk et al. study (2018). Such a difference in living standards can be seen in the technology access throughout the country. The internet coverage nationwide differs in urban and rural areas: 76% of the urban population has internet access while only 44% in the countryside, creating a gap between students in different settings to study and learn new information using online technologies. Moreover, due to the lower income origin, it is reported that only 56% of Ukrainians have a computer at home (Nagy, 2017). At the same time, it may be connected not with the financial difficulties but a lack of necessity of having a PC (Kharazishvili et al., 2019).

For a better understanding of Ukraine, first, it is required to dig into the historical prerequisites of a current society formation. Ukraine lost its independence in 1920 after the Russian invasion and became a part of the USSR for 72 years (Kuzio, 2001). For that time, they have been striving to create a separate from Russia solid individual identity (Wanner, 1998). However, the USSR's (and current Russian's as well) "Russification" policy tried to prioritize the Russian language over Ukrainian and unite the history and culture to strengthen the Ukrainians' sense of belonging to the USSR's culture. Such a long-term policy of erasing Ukrainians as a separate nation led to creating a sense of the Ukrainian language as a 'provincial' and, in contrast, marshaled demarcation and rejected "a reunion with Russia" (Wanner, 1998; Triandafyllidou, 1998; Motyl, 1998).

Being independent now for 31 years, after the collapse of the Soviet Union, Ukraine finally turned from a uniform administrative entity to an independent state (Mezentsev et al.,

2015). Consisting of different nations, but predominantly ethnically Ukrainians and Russians, the two languages were spoken mainly by the public - Ukrainian and Russian due to the USSR's historical background. Ukraine, since its independence, has been oriented toward western-style democracy, with some disputes regarding the path of state development: whether it should be European-focused (Western part, Lviv) or Russian-focused (Eastern part, Donetsk) (Szporluk, 2002). However, since the Russian invasion that started in 2014, the number of people whose attitudes toward pro-Russian policy and the Russian language (especially in the Eastern regions') started drastically decreasing (Benchuk & Trofimovich, 2020). Nevertheless, at the same time, according to the Kyiv International Institute of Sociology (2022), the number of people who maintained a good attitude towards Russia never went beyond 25% (February 2019) until a full-scale invasion started on February 24, 2022. To that date, as of May 2022, only 2% of the respondents still feel tolerant towards Russia. The current war has united Ukrainian citizens from all the regions, strengthening the split between their Soviet background and the current enemy firsthand (Mankoff, 2022).

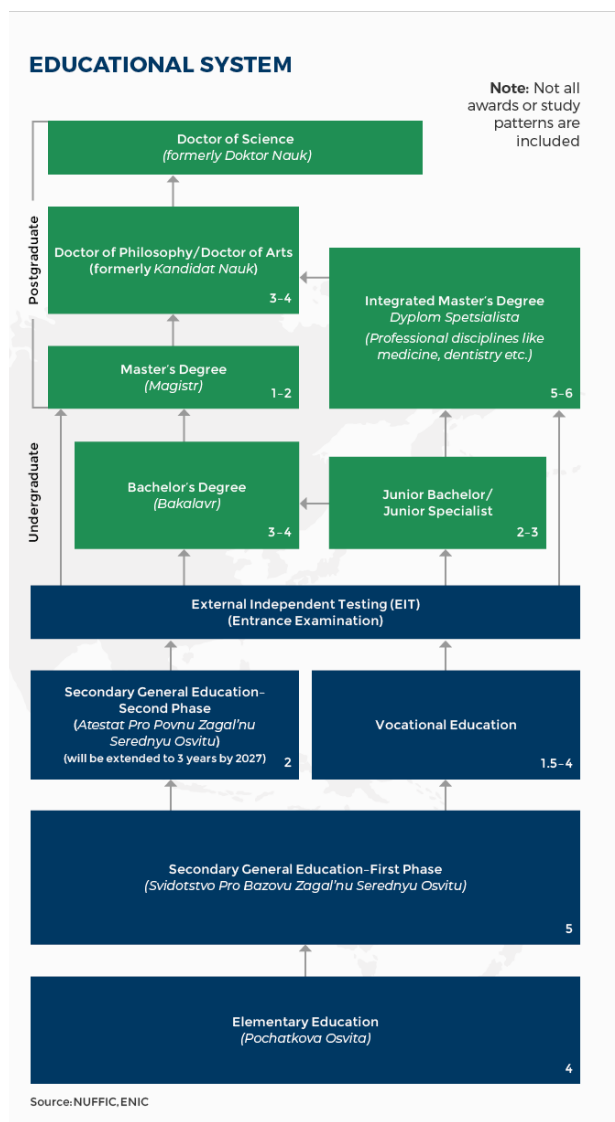
Education

After Ukraine declared its independence, a new period of educational transformation started. The USSR's heritage was the ten years of general education that got extended first to 11 years and then, after the Law on General Secondary Education was adopted in 1999, to 12 years (Lyubar et al., 2003). Entering primary school at the age of 6, pupils study for four years at the elementary level(pochatkova osvita), later joining a lower-secondary (osnovna shkola) level for five years (compulsory), and upper-secondary (starsha shkola) level (can be substituted with the vocational training (profesiino-tekhnichyi navchal'nyi zaklad). To complete general education in

Ukraine, a student must finish nine years of general education (primary and lower secondary). Higher education institutions can be entered upon completion of the total 12 years cycle or after finishing vocational training. A visual representation of the educational system is presented below.

Figure 1

Educational system in Ukraine



Note. Figure provided by WENR (World Education News + Reviews) and demonstrates a full scale of general and higher education of Ukraine after joining Bologna process (WENR,

2019).

Another legacy that Ukraine replaced was the 5-point scale which changed to a 12-point scale starting from the 2002-2003 academic year:

Figure 2

Grading scale in Ukraine

Secondary Grading Scale		
Grade Range	Descriptor	WES Conversion
10–12	Excellent	A
7–9	Good	B
4–6	Satisfactory	C
1–3	Unsatisfactory	F

Note. This table is also a part of the WENR infographic overview and presents a Ukrainian Grading Scale that replaced a 5-point scale (WENR, 2019).

Higher education in Ukraine has also been reformatted under Bologna's process, which it joined in 2005 (Mezentsev et al., 2015). The first attempt toward standardization of education following the Bologna Process standards was made with the law of Ukraine "On Higher Education" during 2008–2011. However, it was not entirely successful, as it relied more on the universities without the required external support. Reforms included stepping away from the Soviet higher education system hierarchy toward a European one to promote students' exchange and European integration (Crosier & Parveva, 2013), corresponding to the Bologna agreement. The ECTS system as a substitute for the modular-rating system (Rashkevich, 2015) was also

introduced into education in 2009 but spread to most universities in the country only by 2014 (Shevchenko, 2019).

Along with that, higher education institutions still assigned not align with the Bologna system levels like "junior specialist," "specialist," and "candidate of science" until 2014. Such long reformation can be explained by the lack of cooperation between the state, educational sector, society and business, resulting in slow progress and low performance (Hladchenko et al., 2016; Rumyantseva & Logvynenko, 2018). With this experience, universities later expanded their administrative functions and gained more independence for the program and curriculum development. At the same time, they were still dependent on the government financially. The transformation of Ukrainian education toward European standards can be seen in Figure 1.

Since 2014 when the hybrid war with Russia started, Ukrainian education needed to adapt to these conditions to maintain the level of education on the same level. At the same time, the ongoing war in the Donetsk and Lugansk regions, as well as the annexation of Crimea, led to the losing control of the Ukrainian government over some of its territories, and they were forced to no longer follow the Ukrainian educational system. Diplomas of the so-called DPR, LPR and Crimea are not recognized either in Ukraine or other countries (Delo.ua, 2015), as MES canceled the licenses of all HEIs that remained in the occupied territories (MES, 2017). To help students get recognized diplomas, special centers "Crimea-Ukraine" and "Donbass-Ukraine" for HEI's entrants on these territories have been established for students who had to study in the occupied territories. Such centers helped those who wished to obtain Ukrainian model diplomas (Word & Action, 2017a). Students' evacuation programs also have been organized, even though the state authorities are preventing such actions in the occupied territories (UIINA, 2015). To the data of

the 2018 year, more than 30 universities have moved from the occupied territories, and 17 more universities continue working there, controlled by Ukraine (MES, 2018).

In 2020, facing the world's biggest pandemic in the last years, the Ukrainian educational system needed to respond to a threat and adapt to the online learning environment (Stukalo & Simakhova, 2020). At that time, Ukrainian universities introduced a blended education model nationwide that combined face-to-face and remote classes according to the Covid-19 epidemic level of danger (there had been introduced four levels: green", "yellow," "orange," and "red") (Cabinet of Ministers of Ukraine, 2020). During the time of the pandemic Ministry of Education and Science of Ukraine developed a regulation system for operations under lockdown. Such regulation covered the workload of the faculty and organizing distance lectures/seminars, students' access to educational resources, and monitoring and managing the educational process. School teachers even used TV lessons developed by the national program "All-Ukrainian School Online." (MES, 2020).

After a full-scale invasion started in February 2022, schools around the country had to switch online again. The present situation gets compounded by a constant risk of getting bombed or a need for an evacuation from the areas of intense warfare. On the 11th of April, 2022, it was reported that in 14 (out of 24) regions, remote, blended, or stationary learning had been organized (Osvita-Info, 2022). Following the agenda, the Ministry of Education and Science released orders "On amendments to some laws of Ukraine in the field of education" (MES, 2022) and "On approval of methodological recommendations on certain issues of completion of the 2021/2022 academic year" (MES, 2022). Changes in the educational laws touch-based the admission process to the educational institutions, regularly based on the exams. This year applicants completing full secondary education in the 2021/2022 academic year are exempted

from passing the state certification. Regarding the recommendations for the educational institutions, the order mainly focused on three areas:

- giving educational institutions autonomy in determination of the end day of the educational process or making appropriate changes to the structure of the academic year;
- ensuring the implementation of educational programs by compacting the educational materials and organizing independent learning activities;
- paying attention to the need for psychological support for children.

MES (2022) also posted relevant websites with psychological support projects and hotlines to be used. In addition, there were also published recommendations for the final grades, acquisition of diplomas, procedures in case an educational document was lost and other recommendations valid for the current situation. Moreover, MES also published materials to help organize the learning environment through video lessons on the All-Ukrainian Online School platform and private educational platforms or TV channels if there is no Internet connection available.

One of unusual challenges for education in Ukraine has become a risk of cyber-attacks organized by Russia since the beginning of the hybrid war in 2014. During the time of the military operations, Ukraine has always been a target of numerous Russian cyber-attacks that spread to computer systems (Global Conflict Tracker, 2022). There are no reported cases of interfering online education by these attacks, but they remain at high risk of being affected, cybersecurity experts say (Merod, 2022). In order to address the issue of educational technology in Ukraine and addressing the current war-state, first we need to learn more about EdTech in general.

Educational Technology in Ukraine

Educational technology in the Post-Soviet space is not understood the same way as in Europe or the USA and is generally confused with pedagogical technologies (Smolyuk, 1999; Yankovych, 2009). Therefore, there can still be a lack of information on educational technologies in Ukraine. However, the number of references to the term “educational technology” has increased after Covid-19 (Stukalo & Simakhova, 2020; Nenko, 2020) as this term drew more attention and was followed by the development of the “Digital education” plan in Europe (Ukraine included).

The first attempt to classify educational technology in Ukraine was made by Smoluk (1999), who suggested five periods of evolution of the concept of EdTech in Ukraine from 1940 to 1990s.

The first period (1940-1950) was characterized by using audiovisual materials in universities: tape recorders, TV, players, and projectors. The term “technology in education” meant the application of engineering in the educational process. The second period (1950-1960) was marked by programmed learning following the behavioral theory of learning. The third period (1970-1980) was described by expanding the pedagogical technology base. Besides audiovisual materials and programmed learning of the basics of computer science, the theory of telecommunications was added to the educational process. In the fourth period (1980-1990), education was characterized by creating computer classrooms, display classes, and interactive video usage. Finally, the integration of educational technologies characterized the fifth period (since 1990) in teacher training programs (Smoluk, 1999).

The main document that declared innovative processes in education since the Ukrainian independence (1991) was the Law of Ukraine on Education (Verkhovna Rada Ukrayini, 1991)

and the Program “Education. Ukraine XXI.” (Verkhovna Rada Ukrayini, 1993). These two documents determined the development of educational technologies in independent Ukraine. In the late 90s-early 2000s, ICT technologies experienced accelerated development. Internet and multimedia technologies have become an integral part of the educational process. Informatization made remote education available in Ukraine (Yankovych, 2009). However, it remained low in higher educational institutions until recent years. Ukrainian joining the Bologna Declaration also contributed reformation of the educational system. The 2004-2005 academic year was declared the year of the latest learning technologies with the integration of the ICT technologies available at that time (Stepko et al., 2004). In particular, there was a program at the Ternopil National Pedagogical University with a self-paced course. It consisted of a methodological complex sent to a student in an electronic form (floppy disk, CD or Internet page). It included lectures, seminars, knowledge tests, individual educational and research tasks, a list of terms, recommended literature, tests for self-control and exam questions (Stepko, 2004). Such cases demonstrated a switch from using ICT in education to creating a technology-enriched environment in universities. However, the level of such enrichment depended on the resource and financial support, including the electronic libraries, computer networks and other necessary equipment.

Later educational orders as “On approval of the action plan for the development of general secondary, preschool and out-of-school education for the period up to 2012” (Verkhovna Rada Ukrayini, 2010) suggested that attention be devoted to the issue of “developing electronic learning tools that contribute to implementation by students of educational programs and programs for individual education, including those in need of correction of physical and (or) mental development.” A new law “On Education” (Verkhovna Rada Ukrayini, 2017) included

the term “distance education.” It determined the regulations on education in a martial law or emergency by studying remotely “or any other form, the safest for its participants” and highlighted one of the necessary skills for educators as knowledge of educational technologies.

Digital transformation during Covid-19 put Ukraine on 64 from 134 economies worldwide (Network Readiness Index2020) and the second in a lower-middle-income countries group. However, even though Covid-19 forced the world toward online education without asking if facilities, teachers, and students are prepared enough to go online, recent studies (Danyliuk et al., 2021; Ovcharuk et al., 2020; Nenko, 2020) still report a lack of relevant skills and knowledge on digital instruments and distance learning by secondary school teachers, and higher education professors.

Before the pandemic, the level of technical, communicational, informational and computational education regiments was even lower than in 2020 in Ukraine. For example, measuring students' and professors' digital competency in 2017 showed moderate-to-low levels of technical, social and informational competency (Blayone et al., 2016). At that time, neither students nor professors were ready for a fully online learning environment. However, a similar study conducted in 2018 reported a high level of readiness among university students (Blayone et al., 2018).

Most students are familiar with ICT technologies that can be useful to study in a university, such as text editors, spreadsheets and tools for creating demonstration materials, both cloud-based and on PC. For self-study, they use MOOCs like Cisco, Eds and Coursera, primarily for language learning and mathematics. Among other services for frequent use, students listed a dozen others, like educational games and virtual labs, which gives additional evidence of students' broad familiarity with online technologies for study (Vacaliuk et al., 2019).

However, professors in higher education institutions appeared to be not as proficient as students with technologies and experienced difficulties while teaching remotely during the pandemic, even though research reveals that universities quickly adapted to organize the online education process in 2020 (Stukalo & Simakhova, 2020). Most educators spend up to 5 hours online for professional activity and use Google Cloud Services. Moodle remains the most popular ICT tool for universities and the Shchodennyk platform for schools. However, very few use Google Classroom, Netop school and others. The primary issue experienced by most of the teachers was a lack of theoretical knowledge and practical skills to implement distance learning materials (Nenko, 2020).

Moreover, every fifth professor reported an insatiable internet connection that interrupted online classes. This issue can be connected to limited internet access coverage (Danyliuk et al., 2021). Such a result reveals a digital gap between students and educators which can also reflect on the quality of education in general (Ovcharuk, 2020).

Another limitation of e-learning quality is the internet access nationwide that differs in urban and rural areas: at least 76% of the urban population has internet access but only 44% in the countryside (Nagy, 2017). However, later state documents heeded an issue of low level of trust in the innovation activities of higher education, insufficient practice and experience in the implementation of digital technologies which may be skill associated with the lack of digital skills of educators.

The Covid-19 experience led to the developing a Digital Education Action Plan (2021-2027). The priority areas of this action plan are:

- 1) developing a high-performing digital education ecosystem;
- 2) enhancing digital skills and competencies for digital transformation.

Ukrainian education right now is at the first stage of the "Strategies for the development of higher education in Ukraine for 2022-2032," (Verkhovna Rada Ukrayini, 2022) which includes following the structure of the obligations of the European Union and digitalization strategies. However, unfortunately, the initiatives planned for future development had to be temporarily frozen due to the full-scale Russian invasion.

Being in a state of war, education is undergoing inevitable changes facing compelled digitalization. Unlike other countries, Ukraine started adapting to the online learning environment in 2014 when the Russian invasion started in the Donetsk and Lugansk regions. With recent experience, available technologies, and support, switching education to martial law mode can psychologically affect students and teachers. However, at the same time, their digital competence can now help them adapt to the online environment better. The Ministry of Education is organizing the projects to help students in a state of uncertainty. Among them are the All-Ukrainian school online and Learning without borders projects organized with the Ukrainian Institute of Educational Development support (Verkhovna Rada Ukrayini, n.d.).

All-Ukrainian school online is an online platform for remote and blended learning for students; methodological support for teachers. Its goals are to provide education seekers with free, equal and high-quality educational materials and organize distance education easier. Currently, more than 1800 videos, tests and materials for self-study are available for 18 core subjects of general school. In addition, teachers can find recommendations for working remotely or using a blended approach with students (All-Ukrainian School Online, 2022).

Prometheus is the leading online education platform in Ukraine, with over 700 000 online registered students and over 90 online courses cooperating with Ukrainian universities, leading professors, international organizations and the government.

Learning Without Borders is a project developed to respond to the war's current events to help Ukrainian children receive education online. Currently, it includes numerous Ukrainian and international initiatives developed or opened access for pre-school, school and university students to maintain access to education and psychological support during wartime.

Future Trends

Regarding the future trends of the Ukrainian education, the Prime Minister released an order on “Strategies for the development of higher education in Ukraine for 2022-2032” (Verkhovna Rada Ukrayini, 2022) where Ukraine remains its trend on, Europesation especially after becoming a candidate for the European Union Ukraine will remain following the EU agenda and increase integration with the EU in the future, and it includes the following actions:

- reforming and modernizing the system of higher education;
- promoting convergence in higher education within the framework of the Bologna process;
- improving the quality and importance of higher education;
- deepening cooperation between institutions of higher education;
- empowering institutions of higher education;
- activation of the mobility of students, scientific, scientific and pedagogical workers.

Educational technology is becoming more necessary than a trend due to the changing world, digital competencies required for all professions and a tendency to a neoindustrialization. Higher education has become a mechanism for forming a highly educated, responsible population. The development of the information society and high-tech economy needs mass higher education, which requires a high level of education and the ability for critical thinking

from every modern person. Therefore, higher education is becoming a necessary strategic element for the preservation of society.

Strengths and Challenges

Based on the documents, current situation in Ukrainian education and technology and future trends, we can see that the government directs education towards strengthening ties with Europe. Therefore, to see the prospects regarding such integration, we should consider the gap between rural and industrial areas in Ukraine, as well as between Ukraine and countries of EU. For that purpose there was developed a table with comparative characteristics of Ukrainian society in general and profiles of digital literacy of educators and students with the EU countries.

Table 1

Comparison of Ukrainian and EU-countries Educational features

Criteria	Similar/Different	Explanation
Internet Access	Similar to Southern European countries	Ukraine is in the same category as most Southern European countries (Romania, Serbia, Croatia, Greece, Italy, etc) but on a lower level than Nordic European with between 25% and 50% of citizens with no internet access (Dreesen et al., 2020).
Educators' readiness to teach online	Different	European educators show a higher level of digital literacy (Mirle, 2019) than Ukrainian (Ovcharuk, 2020).

Students' readiness for remote education	Somewhat Similar	Both Ukrainian and European students' digital skills are high for everyday purposes, but European undergrads showed a low intermediate level of digital skills for content creation (e.g. concept maps for information synthesis) (López-Meneses et al., 2020).
Popular Services for Online Education	Somewhat Similar	Both Ukraine and Europe tend to use Zoom, Google Drive, and Moodle (Vacaliuk et al., 2019; Wang, 2020). However, Ukrainian schools use national LMS, and some European universities use Blackboard instead of Moodle.
Computer usage	Different	In comparison with EU countries where on average 83,5% of people use a computer (OECD, 2022), in Ukraine this number is only 56% (Nagy, 2017).
Smartphone usage	Different	EU countries' smartphone usage is at least 65% (in Hungary) while in Ukraine it is 41% (Nagy, 2017).

Note. This table demonstrates similarities and differences between the educational features and environment in Ukraine and UN-countries.

From the data above it may be seen that even though Ukraine presents as a European country with some similar characteristics to Southern EU countries, there are still some characteristics that show its lower-income origin and can be addressed over time. Some of the issues, for example, the gap associated with the difference in Internet coverage in urban and rural areas with the overall lower level of Internet access is being solved by the Starlink (Meaker, 2022). However, right now it assists primarily military communication. At the same time, future plan for Ukrainian reconstruction, being discussed in EU and between Ukraine allies (European Commission, 2022), creates a possibility that the financial gap existed before the full-scale invasion and even widened due to the destroyed infrastructure can be closed, which will resolve the issues emerged in the comparison.

One of the challenges connected with the implementation of educational and distance technologies, however, is a low growth of the human capital in comparison to the developed countries, which is a disadvantage for technological development and improving the quality of life in a country. To address such problem there is a need to create a disclosure for a human potential in education. The Council of Europe has adopted lifelong learning as one of the main components of the European social model as the accelerating the pace of renewal of professional knowledge is a challenge to be addressed by lifelearning education. Moreover, transition to the educational system of European Union leads to the widespread use of ICT and can increase competition in the international education market and create a need for a highly developed instructional designers to compete.

One of the main factor that can prevent intervening new educational technologies is the demographic factor and declining population. Million of Ukrainians had to flee country to save themselves from the war and stay in temporary residents in EU or other countries. Hence, we can

see that Ukraine is developing targeted action plans on developing education and educational technology in the country, but at the same time all of the actions targeted at the educational sector have been postponed due to the ongoing war. We believe that once the war ends, Ukraine will be able to resolve proceeding issues with the help of European colleagues that are also helping right now in developing the necessary resources for students at that difficult times. Those international projects will be covered in the next section.

Educational Technology Resources

Educational technology in Ukraine is a relatively new field of research, as usually it has been used in the meaning of "instructional strategies," and research is mainly devoted to an idea of the usage of instructional strategies in education (Yankovych, 2009). Smoluk (1999) also programmed instructions, audiovisual tools, e-learning strategies, ICT technologies and remote learning. This chapter describes key organizations in Ukraine and internationally associated with educational technology development in Ukraine.

The Ukrainian government understands the importance of educational technologies and remains the main point of contact in Educational Technology in Ukraine altogether with organizations with which it cooperates. Key people and points of contact can be found in [Appendix 1](#). Projects created on the government orders are being used nationwide like [All-Ukrainian School Online](#), [Learning without Borders](#) and [Educational Hub](#). These platforms have been created by the NGO EdTech company [Osvitoria](#). This organization focuses on several educational areas:

- Restoring education during the war;
- Creating innovative schools (Novopecherska school, Unit.city school);
- Providing equal access to education (Ilearn, First profession);

- Training and supporting teachers;
- Developing an educational community (Osvitira, 2022).

There are also private initiatives that promote technologies and innovations in education:

- Online schools ([Liko Education Online](#), [Alterra School](#), [Modern School](#), [Dar School](#), [Jamm School](#))
- Massive Open Online Courses providers ([Osvitoria](#), [Prometheus](#))
- Instructional materials for educators ([DOCCU](#), [Baza Resorciv](#))

Many international partners like Unicef, Technology Industries of Finland and Intel Education for the Future are among the main partners of Ukrainian educational technology development.

[Unicef](#) supports national initiatives and cooperates in creating digital educational decisions

Unicef. Ukraine, 2022). [Technology Industries of Finland](#) - translated their educational and educational materials into Ukrainian ([The Kip Crew Manages Their Worries](#) and [This works!](#)).

[Intel® Education for the Future](#) - a project that aims to integrate technology into the school curriculum around the world and help educators with EdTech. Estonian EdTech companies, after a meeting with the minister Liina Kersna, opened access to their technologies to Ukrainians with dozens of services. There may be a tendency for other countries to follow this example and create more opportunities for Ukrainian students to study and teachers to teach (Education Estonia, 2022).

Educational Techonogy at University

Tendencies to include educational technology as a compulsory subject or even trajectory of education was stated in the curriculum back in 1990, even though at that time, future teachers mostly learned theoretical aspects of the educational technology process (Yankovych, 2009).

Later courses also included more theoretical information and were insignificant in the overall program (1,5-3 ETSC). Some universities, like Ternopil National Pedagogical University, started collaborating with the Intel® "Teaching for the Future" and integrated their methodological materials for students' learning of ICT technologies (Balik, 2013).

Implementing these training courses in the conditions of a pedagogical university faced specific problems of methodological, organizational and personnel plans. In particular, coordination of the course according to the curriculum of the university, the need for a course to the schedule, lack of skills of trainers, lack of motivation among teachers, etc. However, this program trained several generations of students from 2007 to 2013. Such long-term projects changed the whole education model in a university, where professors demonstrated a higher level of digital literacy through collaboration with students and colleagues via digital tools and resources. University started using tools like Google Academy, Google+ (collaborative learning), digital portfolio (open source technology), and MOODLE (Balik, 2013). Through the initiatives of single universities, the help of private and international organizations and government support, we hope that in the future, all future Ukrainian educators will receive appropriate educational technology training and/or course. Likely, it will soon appear in higher education the same way it is perceived in Europe and the US, following the 2022-2032 goals for education in Ukraine.

Factors to be considered when working in Ukraine

In order to support Ukrainian education during and after the war to improve its education and educational technology in the region, we should consider not only the economic, demographic and language challenges described throughout the paper but also its unique features should be applied.

Ukraine is a lower-middle-income country with an average living wage of \$140/month (Ukraine Living Wage Individual, 2018). Therefore, EdTech companies should consider this factor while assigning prices to their products in Ukraine. Furthermore, being in a state of war, people may be unable to join online synchronous classes or use computer-based technologies (Kruszewska & Lavrenova, 2022). As a result, stakeholders need to contemplate suitable technologies in current settings. Furthermore, a digital literacy gap still exists in society between different age categories (Nagy, 2017). Therefore, the target audience's age will also influence a media tool selection.

Among the unique characteristics are the Ukrainian nation's patriotism and disgust towards the shared Soviet background, including the Russian language (Havunka, 2022). At the same time, a post-Soviet organization tends to use the Russian language as the most understood in the shared post-soviet community, which they would instead not do, as some people believe that speaking Russian equals supporting an enemy (Zbruc, 2022). Therefore, more careful examples of the content should be chosen, as a war topic is susceptible. In addition, there should be minimum information related to the conflict itself and the Ukrainian past under Russian oppression due to a possible PTSD reaction (Kruszewska & Lavrenova, 2022).

Most importantly, it is essential that more people still remember that the war is ongoing and millions of people need quality education right now, so more organizations participate in creating safe spaces for kids, considering their mental features and assisting educators in teaching during that difficult times.

Appendix 1. Key People and Points of Contact in Ukrainian education

The president of Ukraine: Volodymyr Zelenskyy (Presidentpressoffice@pu.gov.ua)

Prime Minister of Ukraine: Denys Shmyhal (prshmygal@kmu.gov.ua)

Minister of Education and Science: Serhii Shkarlet (serhiy.shkarlet@mon.gov.ua)

Minister for European and Euro-Atlantic Integration of Ukraine: Stefanishyna Olha
(vpm.eu.nato@kmu.gov.ua)

Minister of Social Policy of Ukraine: Lazebna Maryna (info@mlsp.gov.ua)

Address: 12/2, Grushevsky st., Kiev, Ukraine, 01008.

Phone Number: +3 (044) 256-69-69

Working hours: Monday-Thursday, 9:00 - 18:00, Friday 9:00-16:45.

Osvitoria: info@osvitoria.org, +380501050000

All Ukrainian School Online: info@e-school.net.ua

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